The impact of social and motivational resources on cognitive and emotional health in old age

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Abstract

We live longer, healthier lives than ever before. However, this prolonged life span is associated with growing health problems in the last phase of life. As aging is often accompanied by physical and mental decline, resources in old age are an important issue. While social resources have been extensively studied in the previous decades, less is known about the impact of motivational resources on health outcomes in old age and if they play a role in the relationship between social resources and health outcomes. This PhD thesis is based on four articles: a cross-sectional research study investigating the role of social, interpersonal and motivational resources as predictors of adjustment disorder (AJD) symptoms in old age (Paper 1); a longitudinal research study investigating the role of motivation-related occupational abilities and their interaction with social network variables as predictors of risk of dementia (Paper 2); a cross-sectional research study investigating social network and self-efficacy as predictors of cognitive functioning (Paper 3); and a cross-sectional research study investigating the impact of motivational and social resources on depression in individuals with and without cognitive impairment (Paper 4). It was hypothesized that i) social resources are related to cognitive and emotional health; ii) that motivational resources are related to cognitive and emotional health and iii) that motivational resources mediate the impact of social resources on health outcomes.

Motivational resources were found to be associated with less AJD symptoms (Paper 1), lower risk of dementia over the long term (Paper 2), higher cognitive functioning (Paper 3), and lower depression (Paper 4). Also, motivational resources mediated the impact of social resources on cognitive functioning (Paper 3), depression (Paper 4), and AJD symptoms (Paper 2). Different aspects of social resources, namely social support and social network

size, had different impact on health outcomes. This PhD thesis concludes that different aspects of social resources are related to different health outcomes; that motivational resources are related to cognitive and emotional health; and that the impact of social resources on emotional or cognitive health is mediated by motivational resources.

While coping assistance provided by supportive others and control beliefs over traumatic adversity may constitute the underlying mechanisms linking social support with emotional health outcomes such as depression and AJD symptoms, health-promoting behaviours, lower stress levels, and stimulating activities may account for the beneficial impact of social network size and motivational resources on cognitive functioning and risk of dementia in older age. As motivational resources can be enhanced with different techniques and strategies, therapy outcomes would benefit from the implementation of modules to enhance volitional competences.

Zusammenfassung

Noch nie zuvor in der Geschichte der Menschheit war die Lebenserwartung höher und die Gesundheitsversorgung besser. Diese verlängerte Lebensspanne ist jedoch mit zunehmenden Gesundheitsproblemen in der letzten Lebensphase verbunden. Da das Alter oft mit abnehmenden körperlichen und geistigen Fähigkeiten einhergeht, nehmen Ressourcen in dieser Phase einen wichtigen Platz ein. Während soziale Ressourcen in den letzten Jahrzehnten eingehend erforscht wurden, ist über den Einfluss motivationaler Ressourcen auf gesundheitliche Parameter im Alter wenig bekannt. Auch stellt sich die Frage, inwiefern motivationale Ressourcen die Einwirkung von sozialen Ressourcen auf die Gesundheit beeinflussen. Diese Dissertation basiert auf vier Artikeln: Eine querschnittlich angelegte Forschungsstudie, welche die Rolle sozialer, interpersonaler und motivationaler Ressourcen als Prädiktoren von Anpassungsstörungs (AJD) - Symptomen im Alter untersucht (Artikel 1); eine längsschnittlich angelegte Forschungstudie, welche die Rolle von berufsbezogenen motivationalen Fähigkeiten und deren Interaktion mit sozialen Netzwerkparametern als Prädiktoren des Demenzrisikos untersucht (Artikel 2); eine querschnittlich angelegte Forschungsstudie, welche die Rolle des sozialen Netzwerks und Selbstwirksamkeit als Prädiktoren der kognitiven Funktionen im Fokus hat (Artikel 3); und eine querschnittlich angelegte Forschungsstudie, welche den Einfluss von motivationalen und sozialen Ressourcen auf Depression bei Menschen mit und ohne kognitive Beeinträchtigung untersucht (Artikel 4). Folgende Hypothesen wurden aufgestellt: Dass (i) soziale Ressourcen mit dem kognitiven und emotionalen Gesundheitszustand zusammenhängen; (ii) dass motivationale Ressourcen mit dem kognitiven und emotionalen Gesundheitszustand zusammenhängen; und (iii) dass motivationale Ressourcen den Einfluss von sozialen Ressourcen auf gesundheitliche Paramter mediieren.

Es zeigte sich, dass motivationale Ressourcen mit weniger AJD - Symptomen (Artikel 1), mit einem niedrigeren Demenzrisiko (Artikel 2), besseren kognitiven Funktionen (Artikel 3) und niedrigeren Depressionsindikatoren (Artikel 4) assoziiert waren. Auch mediierten motivationale Ressourcen den Einfluss sozialer Ressourcen auf kognitive Funktionen (Artikel 3), Depression (Artikel 4), und AJD – Symptome. Verschiedene Aspekte sozialer Ressourcen, nämlich soziale Unterstützung und soziales Netzwerk, hatten einen unterschiedlichen Einfluss auf gesundheitliche Parameter.

Diese Dissertation folgert, dass verschiedene Aspekte sozialer Resourcen mit unterschiedlichen gesundheitlichen Parametern assoziiert sind; dass motivationale Ressourcen mit dem kognitiven und emotionalen Gesundheitszustand zusammenhängen; und dass der Einfluss sozialer Ressourcen auf die kognitive und emotionale Gesundheit durch motivationale Ressourcen mediiert wird.

Während die Unterstützung des sozialen Netzwerks im Umgang mit schwierigen Lebenssituationen und die Überzeugung, traumatischen Erlebnissen nicht schutzlos ausgeliefert zu sein, den zugrundeliegenden Mechanismus bilden könnte, welcher den Einfluss von sozialer Unterstützung auf emotionale Gesundheitsparameter wie Depression und AJD – Symptome erklärt, sind möglicherweise gesundheitsfördernde Verhaltensweisen, tiefere Stresslevels und stimulierende Aktivitäten verantwortlich für den positiven Einfluss der Grösse des sozialen Netzwerks und der motivationalen Ressourcen auf kognitive Funktionen und Demenzrisiko im Alter. Da motivationale Ressourcen mit verschiedenen Strategien gefördert werden können, würde die Wirksamkeit der Therapie von einer Implementation von Modulen zur Förderung von volitionalen Kompetenzen profitieren.

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1. Introduction and Aims

According to Lutz, Sanderson, and Scherbov (2008), the proportion of the global population of the 60 years old and above increases from 10.0% in 2000 to 21.8% in 2050 and then to 32.2% in 2100 Therefore, aging and associated health care needs take an increasingly central place in public health (Lloyd-Sherlock, 2000). Nearly all elderly individuals have to deal with illness and disability in old age (Guralnik, Fried, & Salive, 1996). Besides physical health problems, mental disorders in old age are common. The most frequent mental health disorders in old-age are dementia and depression (Riedel-Heller, Busse, & Angermeyer, 2006). With growing age, the risk of dementia increases exponentially (Corrada, Brookmeyer, Paganini-Hill, Berlau, & Kawas, 2010; Ritchie, Kildea, & Robine, 1992). In the last decades, psychological research has turned away from an exclusive focus on pathology and has increasingly focused on the impact of individual resources on stress resilience and well-being (Hobfoll, 2002; Seligman & Csikszentmihalyi, 2000). Rowe and Kahn (1997) identified three main elements of successful aging: First, individuals have to avoid disease and disability; second, they have to maintain high cognitive and physical capacity; and finally, active engagement with life has to be prolonged. Thus, the emphasis is at least partly on strengthening resources. A large body of evidence confirms the beneficial impact of resources such as social support and self-efficacy on depression (Cutrona & Troutman, 1986; Saltzman & Holahan, 2002), well-being (Antonucci & Jackson, 1987; Karademas, 2006) and even mortality (Holt-Lunstad, Smith, & Layton, 2010; Penninx et al., 1997).

The general aim of my dissertation was to investigate the contributions of social and motivational resources in explaining cognitive and emotional health in the elderly. Social resources have proved to be crucial for both cognitive (Fratiglioni, Wang, Ericsson, Maytan,

& Winblad, 2000; Holtzman et al., 2004) and emotional health (Guay, Billette, & Marchand, 2006; Oxman, Berkman, Kasl, Freeman, & Barrett, 1992). However, there is a lack of studies concerned with the role of motivational variables in the social resources-health outcome relationship.

The more specific research questions are as follows.

i) Are social resources related to outcomes associated with cognitive health (cognitive status, risk of mild cognitive impairment, risk of dementia) and emotional health (adjustment disorder symptoms, depression) in old age?

ii) Are motivational resources related to cognitive and emotional health?

iii) Is the impact of social resources on cognitive / emotional health mediated by motivational resources?

This PhD thesis is based on four articles: a cross-sectional research study investigating the role of social, interpersonal and motivational resources as predictors of adjustment disorder symptoms in old age in a Swiss sample (Paper 1); a longitudinal research study investigating the role of motivation-related occupational abilities and their interaction with social network variables as predictors of risk of dementia over 8 years in a German sample (Paper 2); a cross-sectional research study investigating social network and self-efficacy as predictors of cognitive functioning in a Swiss and German sample (Paper 3); and a cross-sectional research study investigating the impact of motivational and social resources on depression in individuals with and without cognitive impairment in a Swiss and German sample (Paper 4).

It was hypothesized that i) social resources are related to cognitive and emotional health; ii) that motivational resources are related to cognitive and emotional health; and iii) that motivational resources mediate the impact of social resources on health outcomes.

In the following chapters, I will first describe the resources needed in the context of successful aging and give a short introduction of some concepts in the context of cognitive and emotional health in old age. Then, I will elaborate on social resources in old age and their impact on cognitive and emotional health. The subsequent chapter addresses the importance of motivation. It begins with a description of the action phase model linking motivation to behaviour, continues with a definition of motivational variables and the impact of motivational variables on health before finally discussing motivational variables as mediators in the social resources-health relationship. A short summary of every PhD study is followed by the discussion, clinical implications of the findings addressing the malleability of social and motivational resources, and an outlook providing ideas concerning future directions.

2. Resources in the context of successful aging

In old age, several changes occur in peoples' lives. Individuals have to deal increasingly with stressful events such as the loss of significant others, serious illness and role loss. Traditionally, research on aging has focused on diseases and disabilities associated with aging. However, research in this area has increasingly concentrated on resources that help people cope with adverse life events and losses in aging. In line with a number of major theoretical perspectives focusing on psychosocial resources (Baltes, 1997; Hobfoll, 1989;

Holahan, Moos, Holahan, & Cronkite, 1999), resources are those entities that either are centrally valued in their own right (e.g., self-esteem, close attachments, and inner peace), or serve as means to achieve valued ends (e.g. money, social support) (Hobfoll, 2002). Cohen and Syme (1985) define social support as the resources provided by other persons, while individual psychological resources refer to personal beliefs such as personal control, optimism and a sense of meaning (Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000). Resource-rich people are believed to age more successfully because they can make more frequent use of the three processes: selection, optimization and compensation (Baltes & Lang, 1997; Freund & Baltes, 1998). In this context, selection refers to reducing the number of goals in order to keep a certain amount of energy for the most important goals or to select new relevant goals in the developmental context. Compensation is defined as using different means to achieve a goal when the former means are no longer available, while optimization aims at the refinement of resources that are needed to reach a goal and to excel in selected domains (Baltes & Carstensen, 1996; Baltes, 1990; Baltes & Lang, 1997). Thus, the more resources that are available, the better the individual can engage in selection, compensation and optimization strategies to choose different goals, the more likely the individual is to reach the goals and the less aging decline will be experienced (Baltes & Lang, 1997). As aging is often accompanied by physical and mental decline, resources remain an important issue in old age (Forstmeier, Uhlendorff, & Maercker, 2005).

In the following chapter, I will introduce some concepts in the context of cognitive and emotional health in old age, which are relevant for my dissertation, namely dementia, mild cognitive impairment (MCI), adjustment disorder (AJD), and depression.

3. Cognitive and emotional disorders in old age: Key concepts

In old age, the prevalence of cognitive impairment and dementia increases exponentially (Ritchie et al., 1992). While dementia is the most important age-related disorder, mood and anxiety disorders in late life are very common (Byers, Yaffe, Covinsky, Friedman, & Bruce, 2010), with a prevalence of depressive syndromes ranging from 9.3% (Maercker et al., 2008) to 13% (Beekman, Copeland, & Prince, 1999), a prevalence of 2.3% for adjustment disorder and 0.7% for PTSD (Maercker et al., 2008). As there is an accumulation of events requiring adjustment (e.g., physical, cognitive, and social losses) in old age (Maercker et al., 2008), adjustment disorder is particularly relevant in later life (Hardy, Concato, & Gill, 2002). In my dissertation project, I focus on dementia, mild cognitive impairment, adjustment disorder and depression.

3.1. Dementia

Dementia has been extensively researched in the last decades. The prevalence increases exponentially in individuals aged 65 and above (Ritchie et al., 1992). In different studies, prevalence rates in Europe range from 0.6% to 3.7% in individuals aged 65–69 years and 25.2–75% in those aged 90 years and older (Riedel-Heller et al., 2006). Dementia is characterized by a decline in both memory and thinking which impairs personal activities of daily living. The impairment of memory affects the registration, storage, and retrieval of new information, but previously learned information may also be lost (World Health Organization, 1992). At least one of the following cognitive domains is impaired: Language, perceptual skills, constructive abilities, problem solving (American Psychiatric Association,

2000). In paper 2, the clinical diagnosis of dementia was made according to DSM-IV criteria (American Psychiatric Association, 1994). For each participant, consensus conferences of physicians and psychologists were held. SIDAM (Structured Interview for the Diagnosis of Dementia of Alzheimer Type, Multi-Infarct Dementia, and Dementias of Other Etiology) diagnostic algorithms based on the DSM-IV diagnostic guidelines were used to diagnose different types of dementia (Zaudig et al., 1991).

Alzheimer's disease (AD) is the most frequent dementia-related disease (Stevens et al., 2002). AD is a primary degenerative cerebral disease of unknown etiology and usually develops slowly over several years (World Health Organization, 1992). Characteristic changes in the brains include a reduction in the population of neurons, neuritic plaques consisting largely of amyloid, and granulovacular bodies. Neurochemical changes associated with AD include a marked reduction in the enzyme choline acetyltransferase, in acetylcholine itself, and in other neurotransmitters and neuromodulators. Dementia in AD is at present irreversible. Several features are required for a diagnosis: Presence of a dementia as described above; insidious onset with deterioration; absence of clinical evidence suggesting that the mental state may be due to other systemic or brain disease which can induce dementia; absence of a sudden onset, or of neurological signs of focal damage. Dementia in AD may coexist with vascular dementia (World Health Organization, 1992).

The clinical diagnosis of AD in paper 3 and 4 corresponded to the diagnosis of "probable Alzheimer's disease" based on the criteria for AD established by the National Institute of Neurological and Communicative Disorders and Stroke/Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA). According to these criteria, diagnosis is positive if there is a history of cognitive decline and evidence of impairment in memory and at least one other cognitive domain. Only mild AD cases with a score of 1 in the Clinical

Dementia Rating (CDR) scale (Morris, 1993) and scores between 18 and 24 in the Mini Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) were included.

3.2. Mild Cognitive Impairment (MCI)

Mild cognitive impairment (MCI) refers to the transitional state between normal aging and dementia. Individuals are typically cognitively impaired while not meeting the criteria for dementia. MCI is associated with an increased risk of developing dementia (Fischer et al., 2007; Peltz, Corrada, Berlau, & Kawas, 2011; Petersen, 2000). In paper 3 and 4, MCI was defined according to the international consensus criteria (Winblad et al., 2004). According to Winblad et al. (2004), several criteria must be fulfilled for a diagnosis of MCI: absence of dementia as diagnosed by DSM–IV criteria (MMSE ≥ 24); cognitive decline, i.e., self and/or informant report and impairment on objective tasks, and/or evidence of decline over time on objective cognitive tasks; preserved basic activities of daily living and not exceeding minimal impairment in complex instrumental functions (CDR ≤ 0.5); at least mild impairment in one of the following cognitive domains: memory, language, praxis, executive function, and attention.

3.3. Adjustment disorder (AJD)

According to the World Health Organisation (1992), adjustment disorders (AJD) refer to states of subjective distress and emotional disturbance as a reaction to a significant life change or life event. This disorder is usually accompanied by impairment in social functioning and performance; the stressor may have affected the social network of the individual. Symptoms include depressed mood, anxiety, worry or a mixture of these; a feeling of inability to cope, plan ahead and some degree of disability in the performance of daily routine. None of the symptoms is of sufficient severity or prominence in its own right to justify a more specific diagnosis (World Health Organization, 1992). The onset is usually

within 1 month (World Health Organization, 1992) or 3 months (American Psychiatric Association, 2000), respectively, of the occurrence of the stressful event or life change. AJD is a frequent disorder in medical settings and clinicians appreciate the possibility of assigning adjustment disorders as 'wild card' diagnoses. Given the high prevalence rates of adjustment disorders and their scientific neglect, some researchers suggest a revision of this disorder (Baumeister & Kufner, 2009; Casey, Dowick, & Wilkinson, 2001). Semprini, Fava, and Sonino (2010) note that the diagnosis of adjustment disorder is not characterized by consistent clinical description and prognostic features and that it lacks adequate differentiation from other disorders. Maercker, Einsle, and Köllner (2007) have proposed a new diagnostic model of AJD (Adjustment Disorder New Module; ADNM) conceptualizing AJD as a stress-response-syndrome, similar to posttraumatic stress disorder (PTSD), acute stress disorder, or complicated grief (Horowitz, 1997). The initial psychosocial stressor is not life-threatening and therefore of a different quality or magnitude than PTSD. The ADNM consists of a life event list and a survey of symptoms relevant to adjustment disorder. The three core symptoms categories consist of intrusion (eg, constantly thinking about the event), avoidance (eg, not talking about it), and failure to adapt (eg., loss of interest in leisure activities). Furthermore, subtypes of AJD can be specified in congruence with the DSM-IV diagnosis: depressed mood, anxiety, mixed emotional features, disorders of impulse control, and mixed or unspecified subtypes. As a major advantage, the new model enables the definition of psychopathological mechanisms underlying AJD, namely interaction among the symptoms of intrusion, avoidance, and maladaptation. The new AJD model and diagnostic procedure has already been applied in several studies (Bley, Einsle, Maercker, Weidner, & Joraschky, 2008; Dobricki, Komproe, de Jong, & Maercker, 2009; Forstmeier & Maercker, 2007) and is used in paper 1 to assess AJD.

3.4. Depression

In an episode of major depression, the individual suffers from depressed mood, loss of interest and enjoyment, and reduced energy expressed by marked tiredness after only slight effort (World Health Organization, 1992). Further common symptoms are reduced concentration, attention, self-esteem, self-confidence; ideas of guilt and unworthiness, pessimistic views of the future, ideas or acts of self-harm or suicide, disturbed sleep and diminished appetite. A duration of at least 2 weeks is usually required for diagnosis. Depressed individuals typically lose interest in activities they normally enjoy (WHO; 1992). In paper 4, I focus on depressive symptoms in cognitive unimpaired and cognitively impaired individuals assessed by the Geriatric Depression Scale (GDS) (Yesavage et al., 1983). Because symptoms typical for depression such as apathy, insomnia, and weight loss may also be due to dementia-related processes, diagnosis of depression in cognitively impaired individuals is difficult (Brodaty & Luscombe, 1996). Depression and cognitive impairment frequently occur together in old age. However, the inter-relationship between them is still not well understood (Korczyn & Halperin, 2009).

To prevent emotional and cognitive disorders such as depression, adjustment disorder and cognitive impairment in old age, resources play a crucial role. In the following chapter, I will address the importance of social resources in old age and their impact health in old age.

4. Social resources in old age – the need to belong

Social relations are an important aspect of healthy aging. The close family of the old individual is the major social support in time of illness, while the extended family represents the major tie to the community (Shanas, 1979). However, a series of studies by Carstensen

(1993) propose that the number of social relationships decreases with older age. According to the Socio-emotional Selectivity theory of Carstensen (1993), individuals increasingly prefer emotionally meaningful social relations while gradually withdrawing from contact with more peripheral relationships. Because time is perceived as limited in higher age, maintaining close emotional relationships becomes more important (Baltes & Lang, 1997).

Baumeister and Leary (1995) proposed a fundamental, innate motivation to relate to other individuals in positive, stable and significant interpersonal relationships which they called “the need to belong” based on a large amount of studies. To ensure enduring relationships, frequent positive interactions are needed. Consistent with this belongingness hypothesis, under most conditions, people establish social relationships with beneficial effects on emotional and cognitive processes (Baumeister & Leary, 1995). Over several decades, intense interest in social support and social resources has revealed the beneficial impact of social support, social network and meaningful social bonds on well-being (McAuley et al., 2000; Rintala, Young, Hart, Clearman, & Fuhrer, 1992), mental health (Kawachi & Berkman, 2001; Kessler & McLeod, 1985), physical health (Hale, Hannum, & Espelage, 2005) and even mortality (Holt-Lunstad et al., 2010; House, Landis, & Umberson, 1988; Penninx et al., 1997).

Most researchers distinguish between structural and functional aspects of social networks (Cohen & Syme, 1985; Due, Holstein, Lund, Modvig, & Avlund, 1999; House, Kahn, McLeod, & Williams, 1985; Thoits, 1995). Structural measures relate to the existence and interconnections between social ties, e.g. the number of relationships, marital status (Cohen & Syme, 1985) and the linkages between the individuals belonging to the social network (Due et al, 1999). Functional aspects assess the qualitative and behavioural aspects of interpersonal relationships relating to social support, e.g. providing affection, feelings of

belonging, or material aid (Cohen & Syme, 1985). Thus, social support refers to the functions performed for the individual by significant others (Thoits, 1995) and to the resources provided by other persons (Cohen & Syme, 1985).

When looking at the impact of social resources on health and well-being, researchers differentiate an overall beneficial effect of support called the *main- or direct effect model* from an indirect effect of social support on health called the *buffering model* (Cohen, 1988, 2004; Cohen, Gottlieb, & Underwood, 2001; Cohen & Wills, 1985). The direct effect hypothesis argues that support enhances health and well-being independently of stress level. The perception that others will help in the face of difficult circumstances results in increased positive affect and higher self-esteem and feelings of control (Cohen & Syme, 1985). On the other hand, the buffering hypothesis argues that support shields individuals from pathogenic effects of stressful events and help people to cope with the situation at hand by buffering negative stress-related influences (Cohen & Wills, 1985). The two models are not mutually exclusive. Rather, they both help to explain the influence of different aspects of social relationships: Structural aspects may influence health via main effects, while functional aspects may buffer stress-induced pathogenic influences (Kawachi & Berkman, 2001).

Throughout this dissertation, I will refer to different aspects of social networks such as social support, social network, frequency of social contacts, and different social aspects in the context of adjustment to critical life events such as social acknowledgment and disclosure with the umbrella term “social resources” while keeping in mind the difference between the concepts. In the following two chapters, I will first describe the impact of social resources on cognitive functioning and then on the impact of social resources on emotional health.

4.1. Social resources and cognitive functioning

There is an increasing body of literature including longitudinal studies that supports the beneficial effect of social resources on cognitive functioning (Bassuk, Glass, & Berkman, 1999; Beland, Zunzunegui, Alvardo, Otero, & del Ser, 2005; Crooks, Lubben, Petitti, Little, & Chiu, 2008; Ertel, Glymour, & Berkman, 2008; Holtzman et al., 2004; Yeh & Liu, 2003). A longitudinal study by Holtzman et al. (2004) showed that high levels of interpersonal activity of individuals aged 50 years and over were related positively to the cognitive status 12 years later. A similar study of Beland et al. (2005) revealed that social integration, family ties, and engagement with family of community-dwelling elderly persons were associated positively with cognitive functioning 7 years later. Barnes, Mendes de Leon, Bienias, & Evans (2004) showed that a higher number of social relations and level of social engagement correlated with a reduced rate of cognitive decline in a population of older African Americans and whites. Lower satisfaction with social support was related to decline over 12 years in episodic memory performance (Hughes, Andel, Small, Borenstein, & Mortimer, 2008) and persons with no social ties were at increased risk of incident cognitive decline over 12 years (Bassuk et al., 1999). Researchers concluded that social relations and social integration generally help to maintain cognitive function (Beland et al., 2005) and delay memory loss (Ertel et al., 2008), while decreased social engagement and a poor social network was associated with a higher dementia risk (Fratiglioni et al., 2000; Saczynski et al., 2006). Consistent with these findings, several studies have shown that an active and socially integrated lifestyle is associated with a decreased risk of dementia (Fratiglioni, Paillard-Borg, & Winblad, 2004; Karp et al., 2006; Wang, Karp, Winblad, & Fratiglioni, 2002).

4.2. Social resources and emotional health in old age

While emotional health problems are a significant cause of disability, they are generally underestimated in health needs assessments (Stewart-Brown & Layte, 1997). In old age, emotional well-being predicts functional independence and even survival (Ostir, Markides, Black, & Goodwin, 2000). As they get older, individuals have to deal increasingly with stressful events such as the loss of significant others, serious illness and role loss. Thus, adjustment to critical life events is an important challenge in old age. Following a significant life change or life event, individuals may experience states of subjective distress and emotional disturbance resulting in adjustment disorder (AJD), one of the most common psychiatric diagnoses (Strain et al., 1998). Compared to the frequency of this diagnosis, research in this area is rare. In a study by Furukawa, Harai, Hirai, Kitamura & Takahashi (1999), patients with AJD reported significantly less social support than normal controls. While research on the link between social support and AJD is limited, social support is considered one of the most important precursors in the development of posttraumatic stress disorder (PTSD) (Guay et al., 2006). Retrospective studies of victims of, for example, sexual aggression, natural disaster or combat, indicate that social support is significantly related to the severity of the PTSD symptoms following a critical incident (Guay et al., 2006).

When looking at social and interpersonal resources in the context of critical life events, the importance of social acknowledgment and disclosure are frequently underestimated and neglected (Müller, Moergeli, & Maercker, 2008). Social acknowledgment refers to the acknowledgement as a victim or survivor of the event (Maercker & Müller, 2004), while disclosure refers to the oral or written communication of stressful life events and associated thoughts and emotions (Pennebaker, 1995). Social acknowledgement and disclosure have both been associated with posttraumatic stress

disorder (Müller & Maercker, 2006; Müller et al., 2008; Ullman & Filipas, 2005). The social cognitive processing model developed by Lepore (2001) postulates that social and contextual variables have an important impact on the cognitive processing of traumatic events. Talking about traumatic experiences can facilitate the cognitive processing.

Similar to AJD, depressive symptoms may arise in the aftermath of a negative life event (Kraaij, Arensman, & Spinhoven, 2002). Depression in old age is common, disabling and undertreated (Katona & Watkin, 1995). A large body of literature supports the link between social support and depression (Antonucci, Fuhrer, & Dartigues, 1997; George, Blazer, Hughes, & Fowler, 1989; Oxman et al., 1992). Especially, psychosocial factors including social support play a crucial role in the etiology of depression in old age (Kivelä, Köngäs-Saviaro, Laippala, Pahkala, & Kesti, 1996; Murphy, 1982; Prince, Harwood, Blizard, Thomas, & Mann, 1997) with social support deficits leading to a higher risk of depression.

5. The importance of motivation

After describing several aspects and the impact of social resources, I will now shift the focus to the importance of motivational resources. First, I will define motivation in a larger context, then in the context of action phase models. Next, I will define motivational variables. Finally, the impact of motivational resources on health outcomes and their role in the social resources- health relationship is described.

Generally, motivational psychologists are concerned with the reasons behind human behaviour (Kuhl, 2010). According to Weiner (1992), the most encompassing definition of the field of motivation is why human organisms think and behave as they do. Different approaches and motivation theories describe different reasons; in recent years cognitive representations of goals have increasingly been believed to motivate a certain action (Kuhl,

2010). Motivational psychologists observe and measure what the individual is doing, how long it takes to initiate an action, how long the individual will remain at a certain activity, and what the individual is feeling before, during, or after the behavioural episode (Weiner, 1992). Since the beginning, motives have been conceptualized as subliminal cognitive-emotional representations providing different action options (Kuhl, 2010).

The term "motivation" in a general context has to be conceptually differentiated from "motivation" in the context of the action phase model theory by Heckhausen and Gollwitzer (1987). Motivation in the action phase model refers to motivational processes relating to goal setting. The focus of this approach is therefore on the goal the individual wants to reach. "Classical" motivational theories believe that the motivation to initiate an action is determined by the desirability of a certain goal and by its feasibility (Achtziger & Gollwitzer, 2010). To reach a goal, a variety of psychological subsystems have to be coordinated and regulated. According to Kuhl and Fuhrmann (1998), volition is required to coordinate these subsystems. Volition refers to the central executive which controls many cognitive, emotional, motivational and temperamental processes that modulate different behavioural tendencies (Kehr, 2004). In the process, explicit action tendencies are competing against other behavioural impulses. The concept of volition is closely related to willpower (Metcalfe & Mischel, 1999), self-control (Muraven & Baumeister, 2000) and self-regulation (Kuhl & Fuhrmann, 1998). In the following chapter, different phases of the action phase model are described.

5.1. The model of action phases – linking motivation to behaviour

To perform a task successfully, the overcoming of volitional problems is required. Volitional problems include initiating an action to reach a goal despite distractions, not giving up in the face of difficulties, and continuing with a task after a disruption. These

motivational processes are embedded and explained within the model of action phases (see Figure 1), the framework of the motivational-volitional theory of goal achievement (Gollwitzer, 1996; Heckhausen & Gollwitzer, 1987).

Action phase models differentiate between the motivational aspect of goal setting and the volitional aspect of goal striving (Gollwitzer, 1996). A preintentional phase characterized by choosing between alternative goals is followed by a postintentional phase (implementing the chosen goal) (Heckhausen & Heckhausen, 2010). Four subsequent phases are distinguished: a predecisional phase, a preactional phase, an actional phase and a postactional phase.

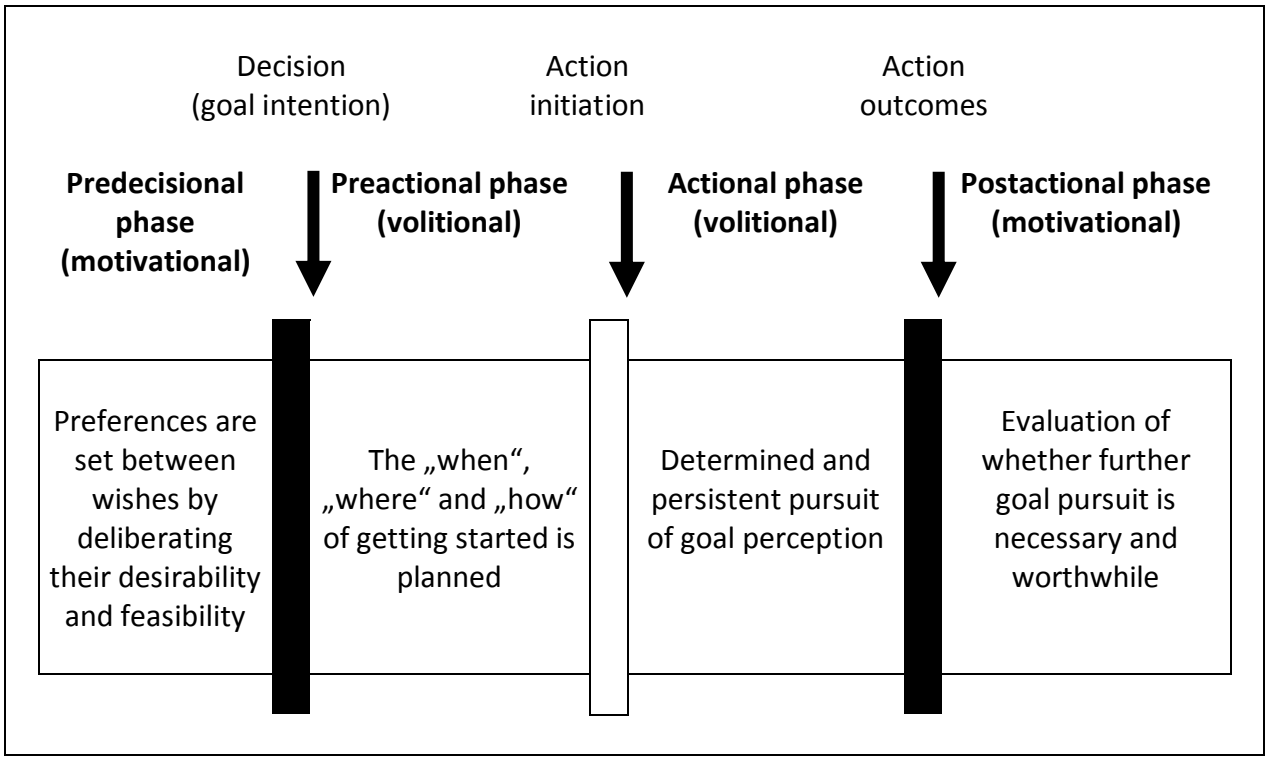

Figure 1: The model of action phases. The model of action phases dissects the course of wish fulfilment into two motivational and two volitional phases. The boxes between the transition points (decision, action initiation, and action outcomes) describe the distinct tasks associated with each of the four phases (predecisional, preactional, actional, and postactional) (Gollwitzer, 1996, p. 289).

Predecisional Phase

In the predecisional phase, people have to set a goal and decide which goal they want to pursue (Gollwitzer, 1996). This phase is characterized by the task of evaluating the desirability and the feasibility of achieving a certain goal (Schwarz & Bohner, 1996) and the transition from wishes and desires to binding goals.

Preactional Phase

Once the individual has chosen which goal to pursue, the appropriate actions have to be prepared and planned to achieve the goal (Gollwitzer, 1990). The transition from the predecisional phase to the preactional phase is often described as the "crossing of the Rubicon", named after the crossing of Cesar of the river Rubicon in Italy. Once Cesar had decided to cross the river, he chose to start a civil war, thus irreversibly deciding to take a first step to realize his decision (Achtziger & Gollwitzer, 2010).

Actional Phase

In the actional phase, the planned actions have to be initiated and executed (Gollwitzer, 1996). With the initiation of goal-directed behaviours, individuals move from the preactional to the actional phase. The main task in the actional phase is to bring goal-directed behaviours to a successful conclusion.

Postactional Phase

At the end of the actional phase, the individual has to decide whether the goal has been reached and the goal-directed actions have resulted in the intended outcome (Schwarz & Bohner, 1996).

5.2. Defining motivational variables

In the postintentional phase, the most important motivational abilities are regulation of motivation, emotion, and attention (Kuhl, 2000). Kuhl and Fuhrmann (1998) postulate that many cognitive, emotional, motivational and temperamental processes are active in parallel to control ongoing behaviour. Motivational abilities are also called self-regulatory or volitional skills (Kuhl & Fuhmann, 1998). However, because motivational abilities in the context of the Motivational Reserve (Forstmeier & Maercker, 2008), a concept described in the next section, focus on the regulation of motivation, Forstmeier & Maercker (2008) prefer the term "motivational abilities". Based on the action phase models, motivational abilities refer to regulation processes in the different action phases and include decision regulation, activation regulation, motivation regulation, and self-efficacy (Forstmeier & Maercker, 2008). Decision regulation, activation regulation and motivation regulation are relevant in different subphases of the postintentional phase, while self-efficacy is closely intertwined with motivational processes in all phases. The different motivational variables are described in the following sections and embedded in the action phase model.

Decision Regulation

Decision regulation is the skill of quickly coming to a self-congruent decision and is needed in the crossover to the postintentional phase. Decision regulation skills are therefore important in the transition from the preintentional to the preactional phase.

Activation Regulation

Activation regulation is the skill of readying oneself to act and is needed to initiate an action. It refers to a self-regulative ability required to initiate and maintain a movement to reach a goal (Kruglanski et al., 2000). Activation regulation skills are important in the transition from the preactional to the actional phase.

Motivation Regulation

Motivation regulation refers to the skill of motivating oneself to persevere and is needed to persevere with or to resume an action in the face of difficulties by considering positive incentives concerning the matter (Kuhl & Fuhrmann, 1998). Motivation regulation skills are primarily needed in the actional phase.

Self-efficacy

Self-efficacy plays a central role in the self-regulation of motivation, as it determines how much effort people put in a task and how long they will persevere in the face of difficulties (Bandura, 1997). Self-efficacy refers to the belief in being able to bring the intended behavior to a successful conclusion through one's own actions (Bandura, 1997). People with high self-efficacy perform better, choose higher goals and better task strategies. Furthermore, they are more committed to high goals (Locke & Kristof, 1996). Thus, self-efficacy is closely intertwined with nearly all action phases: In the predecisional phase, self-efficacy has an impact on the judgment of the feasibility of a certain goal; in the preactional phase, self-efficacy influences the kind of task strategies an individual chooses to reach a goal; in the actional phase, it has an impact on the effort put in the execution of a task and the perseverance in spite of problems.

Motivational Abilities in the Occupational Context

In the occupational context, motivational abilities play a crucial role. In all occupations, motivational abilities are needed to achieve goals and successfully execute different tasks (Forstmeier & Maercker, 2008; Hackman & Oldham, 1976). To estimate former motivational abilities of an individual, we used a measurement method developed by Forstmeier and Maercker (2008) estimating motivational abilities based on the individuals former main occupation. Forstmeier & Maercker (2008) analyzed different variables of the

official occupational classification system of the U.S. Department of Labor (O*NET, (Peterson, Mumford, Borman, Jeanneret, & Fleishman, 1999). The O*NET is a hierarchically structured lexicon of occupations and a large database of work and worker characteristics required for each job. In a study of Forstmeier & Maercker (2008), out of 31 motivation-related variables, the two variables *goal orientation* and *action planning* were significantly correlated with self-reported motivational abilities, but not with former intelligence or current cognitive status. Thus, these two variables were used to estimate midlife motivational abilities.

Goal Orientation

Goals are defined as internal representations of desired states (Austin & Vancouver, 1996). Human beings are goal-oriented organisms – goals are central to understanding motivated behavior (Emmons, 1996). Goal orientation in this context refers to the O*NET Item 4.A.2.b.6 ("developing specific goals and plans to prioritize, organize, and accomplish your work"; Peterson et al., 1999, p. 114). Goal orientation is related to the predicisional phase, where specific goals are developed and is closely related to decision regulation processes.

Action Planning

Planning refers to the development of specific alternative behavioural paths by which a goal can be attained (Austin & Vancouver, 1996) and the development of mental strategies preparing the individual for an action. When planning, an individual anticipates future relevant situational contexts and actions (Gollwitzer, 1996). In this context, action planning relates to the O*NET item 4.A.1.b.3 ("determining time, costs, resources, or materials needed to perform a work activity"; Peterson et al., 1999, p.113). Action planning is needed in the preactional phase to prepare an individual for initiating and executing actions.

Throughout this text, I will refer to motivation regulation, decision regulation, activation regulation, goal orientation, action planning, and self-efficacy with the umbrella term “motivational resources”.

Neural Correlates of Motivational Resources and Processes

What are the neural correlates relating to motivational processes linking intention to action? Studies concerned with neural correlates of willed actions have indicated that dorsal prefrontal cortex (DPFC) is active in tasks involving willed action (Roskies, 2010). Several motivational resources discussed in the above sections seem to be closely related to executive functioning. The term executive functioning refers to mental activity that is involved in the planning, initiation, and regulation of behaviour (Lezak, 1982) and has been related to activation of the dorsal left prefrontal cortex (DLPFC). Several regions in frontal cortex seem to be related to decision making processes and the building of intentions (Cunnington, Windischberger, Robinson, & Moser, 2006; den Ouden, Frith, Frith, & Blakemore, 2005; Ruge, Müller, & Braver, 2010). The DLPFC may be involved in generating cognitive and motor responses (Frith, Friston, Liddle, & Frackowiak, 1991; Lau, Rogers, Ramnani, & Passingham, 2004). Planning has been found to correlate with activation of the left prefrontal cortex (Morris, Ahmed, Syed, & Toone, 1993), the DLPFC and lateral premotor cortex (Dagher, Owen, Boecker, & Brooks, 1999) and the rostrolateral PFC (Wagner, Koch, Reichenbach, Sauer, & Schlösser, 2006). Regarding action initiation, which is required in activation regulation, the most consistently associated brain areas are the rostral cingulated zone and pre-supplementary motor area (Roskies, 2010). Further brain areas primarily involved in motivational processes are the nucleus accumbens (reward-motivated behavior), and the amygdala (fear-motivated behavior) (Cardinal, Parkinson, Hall, & Everitt, 2002; Kalivas & Volkow, 2005).

5.3. The impact of motivational resources on cognitive and emotional health in old age

Several aspects of motivational processes have been found to be associated with cognitive and emotional health. Self-efficacy is the most intensively studied variable in this context and was shown in a series of studies to influence cognitive functioning and emotional health. Self-efficacy has been linked with cognitive functioning in general (Bandura, 1993), academic performance (Luszczynska, Gutiérrez-Doña, & Schwarzer, 2005), and memory performance in old age (Valentijn et al., 2006). Midlife motivational abilities, namely goal orientation and action planning, were shown to predict odds of mild cognitive impairment in old age (Forstmeier & Maercker, 2008; Forstmeier, Maercker, et al., 2011).

Cognitive reserve

What are the underlying mechanisms linking motivational abilities to cognitive functioning? According to the brain reserve hypothesis (Fratiglioni & Wang, 2007; Stern, 2006; Valenzuela & Sachdev, 2006a), a number of factors including education, social network and leisure activities contribute to a reserve postponing cognitive decline. This concept of a cognitive reserve (CR) has been proposed as an explanation for why Alzheimer disease diagnosis may be postponed in older adults with more education or higher occupational status (Stern et al., 1994). Thus, at a particular level of AD pathology, highly educated individuals are less likely to manifest clinical symptoms of dementia (Roe, Xiong, Miller, & Morris, 2007). Regardless of the neuropathological criteria used, education is predictive of dementia (McDowell, Xi, Lindsay, & Tierney, 2007; Scarmeas, Albert, Manly, & Stern, 2006). These results support the theory that individuals with greater cognitive reserves as reflected in years of education are better able to cope with AD pathology without observable deficit in cognition. In general, the concept of brain reserve refers to the

ability to tolerate the age related changes and the disease related pathology in brain without developing clear clinical symptoms or signs.

Motivational reserve

In line with this hypothesis, Forstmeier & Maercker (2008) postulated that exercising motivational factors throughout the lifespan might increase the number of synaptic connections and lead to the compensation of disrupted networks (Forstmeier & Maercker, 2008; Forstmeier et al., 2011). Forstmeier and Maercker (2008) developed the concept of motivational reserve (MR) which incorporates motivational abilities as predictors of cognitive impairment and Alzheimer disease. Motivational reserve can be defined as a set of motivational abilities that provides individuals with resilience to neuropathological damage. Specifically, MR is assumed to be a form of brain reserve that enables to brain to tolerate neuropathological age and dementia related changes without clinical manifestation. In the model of Forstmeier and Maercker (2008), MR and cognitive reserve are complementary concepts (see figure 2). Thus, both MR and CR are assumed to affect current cognitive status. CR is assumed to influence cognitive status directly or via interaction with MR. On the other hand, MR influences cognitive status directly or indirectly via education and CR. Furthermore, the current stress level affects the impact of MR on the current cognitive status. If the stress level is low, the link between MR and cognitive status is believed to be stronger than when the current stress level is high. Exercising motivational abilities throughout life is suggested to increase the number of synaptic connections and strengthen existing pathways, leading to the more efficient use of relevant brain networks and to the compensation of disrupted networks (Forstmeier & Maercker, 2008). The term “motivational reserve” refers to the contribution of lifetime motivational activities to general brain reserve

(Fratiglioni & Wang, 2007; Valenzuela & Sachdev, 2006b)—above and beyond cognitive (Stern, 2006), physical (Podewils et al., 2005), and social activities (Fratiglioni et al., 2000).

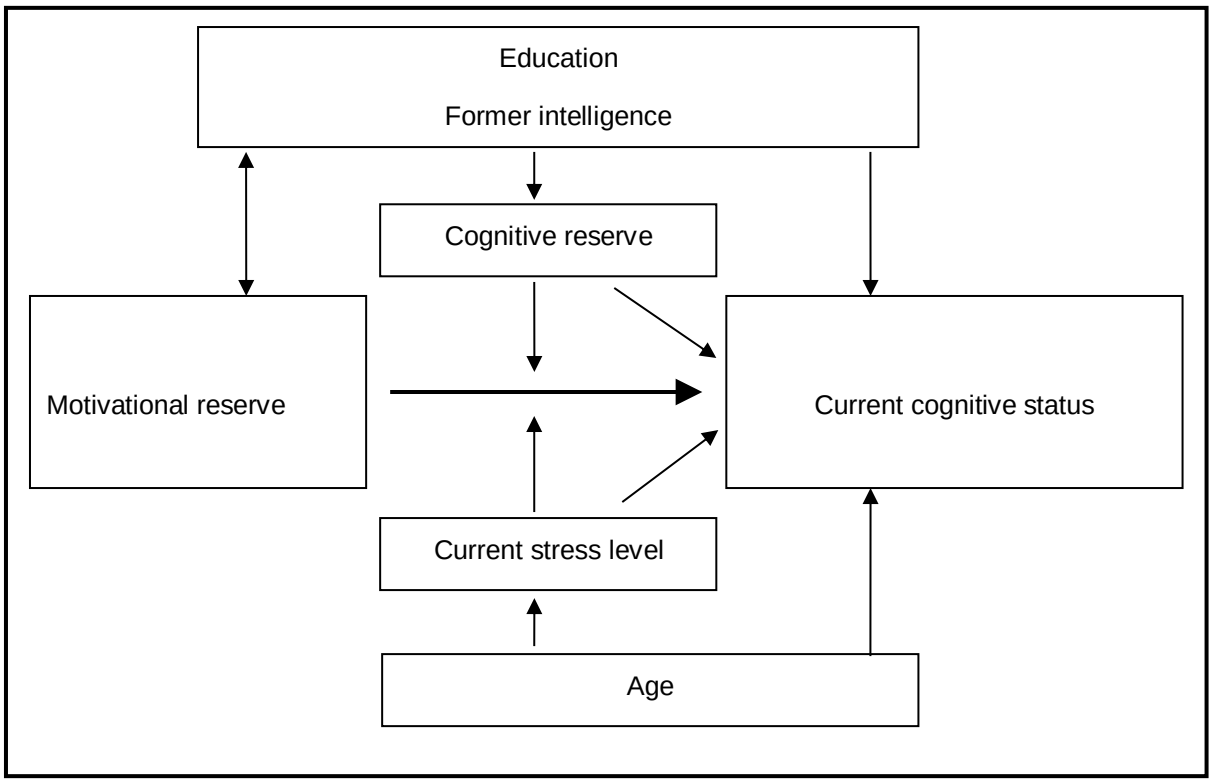

Figure 2: A model of motivational reserve effects (Forstmeier & Maercker, 2008)

Several studies confirm the beneficial effect of motivation-related variables on emotional health. Self-efficacy is negatively associated with depression (Blazer, 2002; Luszczynska et al., 2005) and self-regulatory adaption to stress (Jopp & Rott, 2006). Concepts related to self-efficacy such as external locus of control and levels of mastery (Beekman et al., 2001; Jang, Haley, Small, & Mortimer, 2002) as well as self-regulation (Pyszczynski & Greenberg, 1987; Rehm, 1977; Rholes, Michas, & Shroff, 1989; Strauman, 2002) and, though loosely related to self-efficacy, impulsivity (Granö et al., 2007) were also found to influence depression. Feelings of self-control were shown to predict later symptoms of posttraumatic stress disorder (Walter, Gunstad, & Hobfoll, 2010) and correlate with better adjustment and fewer reports of psychopathology (Tangney, Baumeister, & Boone, 2004). Premorbid motivational abilities were associated with symptoms of apathy and depression in

cognitively impaired individuals (Mortby, Maercker, & Forstmeier, 2011). These and other studies have highlighted the importance of motivational variables in maintaining emotional health (Forstmeier & Maercker, 2008) and reducing depressive symptoms (Forstmeier & Rüddel, 2007).

5.4. Motivational resources as mediators in the social resources – health - relationship

In a variety of studies, motivational variables were shown to mediate the impact of social resources on health outcomes. Particularly self-efficacy and related constructs have been demonstrated to be significant factors. According to the support-efficacy model from Antonucci and Jackson (1987), an individual's general self-efficacy mediates effects of social outcomes on health and well-being. There is evidence that self-efficacy is one of the psychosocial pathways through which social support operates (Berkman, Glass, Brissette, & Seeman, 2000). Bisconti and Bergeman (1999) found that perceived control mediated the relationship between social support and outcomes of psychological well-being and physical health. They suggested that increasing a person's sense of control in social relationships may actually be the underlying factor that produces better psychological and physical outcomes in old age. Likewise, Smith et al. (2000) found that the effect of emotional support on well-being was mediated by interpersonal agency (which means to achieve a goal through interaction with others) and perceived primary control (which is similar to general self-efficacy beliefs). Several findings demonstrating the importance of self-efficacy in the relationship between social support and depression (Benight & Bandura, 2004; Cutrona & Troutman, 1986; Saltzman & Holahan, 2002) are in line with these findings. Further studies found personal resources such as self-esteem (Brown, Andrews, Harris, Adler, & Bridge, 1986), coping strategies (Holahan, Moos, Holahan, & Brennan, 1997), and mastery (Jang,

Haley, Small, & Mortimer, 2002) to play a role in the association between social support and depression. In the discussion section following the findings of the PhD thesis studies, underlying mechanisms providing explanations for the mediating role of motivational variables are discussed.

6. Findings of the PhD thesis studies

Paper 1 investigated the impact of social and interpersonal resources on AJD symptoms in old age and assessed if motivational variables, namely motivation regulation and self-efficacy, mediated the impact of social and interpersonal resources on AJD symptoms in a cross-sectional design. Paper 2 investigated motivation-related occupational abilities – goal orientation and action planning - and social network variables as predictors of risk of dementia in a longitudinal design over 8 years. Paper 3 investigated self-efficacy as a mediator in the relationship between social network and cognitive functioning in old age in a cross-sectional design. Paper 4 investigated the impact of motivational variables (motivation regulation, decision regulation, activation regulation, and general self-efficacy) and social variables (network size, frequency of social contacts, satisfaction with social contacts, and social support) on depression in individuals with and without cognitive impairment. This PhD thesis concludes that i) different aspects of social resources are related to different health outcomes; ii) motivational resources are related to cognitive and emotional health; and iii) the impact of social resources on emotional or cognitive disorders is mediated by motivational resources.

The following sections summarize each paper's findings.

6.1. Paper 1: The Impact of Social and Interpersonal Resources on Adjustment Disorder Symptoms in Older Age. Motivational Variables as Mediators?

Traditionally, gerontology and geriatrics have focused on diseases and disabilities associated with aging. However, a growing body of research is focusing on resilience factors and resources needed when coping with different challenges and critical life events in old age. A variety of studies have shown the importance of social (Antonucci & Jackson, 1987) and personal resources (Bandura, 1997) involved in successful aging. In this study, we focused on adjustment disorder (AJD), one of the most frequent psychiatric diagnoses (Strain et al., 1998), in a sample of 121 adults aged 65–97 years. Adjustment disorders refer to states of subjective distress and emotional disturbance as a reaction to a significant life change or life event (WHO, 1992). As researchers have noted that the definition of AJD is rather loose (Casey, Dowick, & Wilkinson, 2001), Maercker, Einsle, and Köllner (2007) proposed a new diagnostic model of AJD called the AJD-New Module (AJDNM; Maercker et al., 2007). In this new model, AJD was conceptualized as a form of stress-response syndrome with the core symptoms intrusions, avoidance, and failure to adapt after having experienced a critical event.

Two interpersonal resources seem to be especially important when facing adverse life events: disclosure about the critical event (Müller, Moergeli, & Maercker, 2008) and social acknowledgement as a victim of the event (Maercker & Müller, 2004). Thus, both disclosure and social acknowledgement were investigated in the study as important factors associated with AJD symptoms. Social network and social support completed the assessment of social resources. Addressing the role of motivational resources, self-efficacy and motivation regulation were investigated as possible mediators of the relationship between social and interpersonal resources and adjustment disorder (AJD) symptoms.

Both motivation regulation and general self-efficacy correlated significantly with the number of AJD symptoms. Contrary to expectations, social support and social network did not correlate with AJD symptoms. Regarding the interpersonal variables, reluctance to talk and social acknowledgement emerged as crucial factors associated with motivation regulation, general self-efficacy and AJD symptoms. The two motivational variables - general self-efficacy and motivation regulation - mediated the relationship between social acknowledgment and AJD symptoms. However, motivational variables were not found to mediate the link between reluctance to disclose and AJD symptoms. On the contrary, reluctance to talk mediated the relationship between general self-efficacy and AJD symptoms.

The findings that motivational variables mediated the relationship between interpersonal resources and AJD symptoms are consistent with previous research on PTSD (e.g., Benight & Bandura, 2004; Bisconti & Bergeman, 1999; Smith et al., 2000) and with the support-efficacy model proposed by Antonucci & Jackson (1987). The finding that social support and social network did not predict AJD symptoms may be due to the fact that the used questionnaire might be too unspecific with regard to the adaption to stressful experiences in contrast to interpersonal resources (disclosure and social acknowledgement). This study casts new light on the psychological processes that enable older adults to adjust to critical life events and to exhibit resilience, which is important for successful aging.

6.2. Paper 2: Motivation-Related Occupational Abilities and Their Interaction with Social Network Variables as Predictors of Risk of Dementia

Motivational abilities have been shown to act as protective factors against the manifestation of cognitive impairment (Forstmeier & Maercker, 2008; Forstmeier et al., accepted). A growing body of literature shows that social resources are related to risk of developing dementia. People with a moderate or rich social network have a lower odds ratio of dementia than do those with a poor or limited social network (Fratiglioni & Wang, 2007). Several studies have found that especially self-efficacy and locus of control, a similar concept, are linked to social support (Sandler & Lakey, 1982; Krause, 1987). Various studies have confirmed that social support has beneficial effects only to the extent that it enhances perceived self-efficacy (Benight & Bandura, 2004).

This study investigated the impact of motivation-related occupational abilities and social network variables on the incidence of dementia over eight years. Data were derived from the Leipzig Longitudinal Study of the Aged (LEILA75+), a population-based longitudinal study of individuals aged 75 years and older (*N* = 1692 at baseline) that was conducted from 1997 to 2005 in Leipzig (Riedel-Heller, Busse, Aurich, Matschinger, & Angermeyer, 2001). All in all, the study covered a baseline and five follow-up assessments, on average every 1.4 years. Motivation-related occupational abilities were estimated based on the main occupation using the Occupational Information Network (O*NET) database. The O*NET is the official occupational classification system of the U.S. Department of Labor (Peterson et al., 1999) consisting of a hierarchically structured lexicon of some 1,100 occupations and a large database of associated work and worker characteristics. The database includes empirically collected data on the abilities and skills needed in each occupation. Participants'

social networks were assessed using the Practitioner Assessment of Network Type (PANT; Grant & Wenger, 1993; Wenger, 1994). The PANT uses eight pre-coded questions to identify different network types. The PANT measure was originally constructed to assess different network types; however, in order to obtain dimensional scales, we calculated two scores representing the frequency and the proximity of social contacts.

Individuals diagnosed with dementia at a follow-up assessment (n = 179) had significantly lower motivation-related occupational abilities (M = -.07, SD = .84, z = -3.90, U = 42879, p < .001) than did those who were not (n = 593, M = .20, SD = .86). Motivation-related occupational abilities predicted incidence of dementia (HR: .73, 95% CI: .54–.98) in a logistic regression model. Only in one age cohort (79–84 year olds) did motivational abilities significantly predict time to incident dementia in a Cox proportional hazard model (HR: .58, 95% CI: .35–.94). Motivation-related occupational abilities correlated significantly with frequency of contact with friends (r = .11, p < .01), attendance of community and/ or social meetings (r = .16, p < .01), frequency of social contacts (r = .09, p < .05), but not with the proximity of social contacts (r = -.02, *ns*). Interactions between motivational abilities and social network parameters were not associated with dementia. As it is not possible to disentangle different motives for seeking social contacts, the effect of the interaction of motivational-related abilities and frequency of social contact is difficult to interpret and may account for the lack of an interaction effect on incidence of dementia.

Motivation-related occupational abilities were associated with incidence of dementia, but the underlying mechanisms have yet to be determined. Our main hypothesis is that exercising motivation-related occupational abilities throughout life increases the number of synaptic connections and strengthens existing pathways, leading to the more efficient use of relevant brain networks and to the compensation of disrupted networks

(Forstmeier & Maercker, 2008). Also, further studies including distress proneness, stress levels, health behaviors, and various stimulating activities could help to clarify the specific mechanisms linking motivational abilities to cognitive impairment. As various skills involved in the motivational process—e.g., self-regulation (Bandura, 1991; Zimmerman, 2002) and self-efficacy (Bandura, 1997)—are malleable, prevention programs aiming to postpone cognitive decline could benefit from targeting motivational abilities.

6.3. Paper 3: Social Network and Cognitive Functioning in Old Age: Self-efficacy as a Mediator?

There are different pathways through which social resources are believed to have a beneficial effect on cognitive functioning and health in general. Beland et al. (2005) suggested that mechanisms such as a sense of mastery and competence related to previous social roles may positively influence the effect of social relations on cognitive functioning. Self-efficacy referring to the belief in being able to bring an intended behaviour to a successful conclusion through one's own actions (Bandura, 1997) has been shown to be associated with a variety of health and functional outcomes. There is evidence that self-efficacy is one of the psychosocial pathways through which social support operates (Berkman et al., 2000).

This study investigated self-efficacy (self-perceived and rated by an informant) as mediators of the relationship between social network variables (including network size, frequency of social contacts, satisfaction with social contacts, and social support) and cognitive impairment. Participants were 189 adults with a mean age of 75 years, 32 of whom suffered from mild cognitive impairment (MCI), 39 from early-stage Alzheimer's disease (AD), and 118 who had no cognitive impairment. Binary logistic regression and linear

regression models were used to assess the association between the predictor variables and cognitive impairment, controlling for several confounders.

Participants differed in terms of their network size, with a higher number of social contacts in the cognitively unimpaired control group (M = 22.8, SD = 19.4), compared to the cognitively impaired group (M = 13.2, SD = 13.0), $t(185) = 3.62$, $p < .001$. The frequency of social contacts, $t(175) = .35$, n.s., and satisfaction with social contacts , $t(175) = .25$, n.s., did not differ significantly between both groups. Cognitively unimpaired participants reported a lower level of social support than did those in the control group, $t(188) = .07$, $p < .05$. Among the social network variables, only network size was significantly associated with the cognitive status (Mini Mental Status Examination; $\beta = .15$, $p < .05$) and with incidence of cognitive impairment (hazard ratio, HR: .96, 95% CI: .93–.99). General self-efficacy rated by the informant emerged as a significant predictor for cognitive impairment (HR: .85, 95% CI: .78–.92, $p < .05$) in a binary logistic regression analysis and as a significant predictor for cognitive functioning in a regression analysis with MMSE score as the dependent variable, $\beta = .28$, $p < .001$. General self-efficacy rated by the informant mediated the impact of network size on both cognitive functioning and incidence of cognitive impairment.

Although the number of social contacts decreases with increasing cognitive impairment, individuals with MCI or lower cognitive status appear no less satisfied with their social contacts. They do not perceive a lack of social support, and indeed meet as often with other people as do cognitively unimpaired individuals. This result might be surprising, yet it can be partly explained with the Socio-emotional Selectivity theory of Carstensen (1993). This asserts that elderly people maintain or increase involvement in relationships with close friends and family while gradually withdrawing from social contact with peripheral relationships. Surprisingly, self-perceived general self-efficacy did not correlate with

cognitive status or cognitive impairment, while general self-efficacy assessed by the informant was a significant predictor of both incidence of cognitive impairment and cognitive status. However, there are a number of studies showing that self-report of patients suffering from dementia often differs considerably from information collected from caregivers (DeBettignies, Mahurin, & Pirozzolo, 1990). It can be assumed that cognitively impaired participants are less reliable than the informants when reporting their abilities.

Several mechanisms can account for the mediating role of general self-efficacy in the relationship between social network size and cognitive health. In line with the brain reserve hypothesis (Fratiglioni & Wang, 2007), exercising motivational factors throughout the lifespan might increase the number of synaptic connections and subsequently lead to compensation of disrupted networks (Forstmeier & Maercker, 2008; Forstmeier et al., 2011). Higher self-efficacy might contribute to more social and cognitive activities and itself constitute a protective factor in the brain reserve, enabling individuals to tolerate the age-related changes and the disease-related pathology in the brain without developing clear clinical symptoms of cognitive impairment or dementia-related processes (Fratiglioni & Wang, 2007). Further possible mechanisms address the influence of self-efficacy on health behaviors and neuroendocrine reactivity (Cohen, 1988). Although a considerable number of studies have already confirmed the beneficial effect of social resources on cognitive functioning, this study is to our knowledge the first to investigate general self-efficacy as a mediator in this relationship.

6.4. Paper 4: The Impact of Motivational and Social Variables on Depression in Individuals with and without Cognitive Impairment

Depressive symptoms are a frequent cause of emotional suffering in old age (Blazer, 2003) and increase risk of death among older adults (Blazer, Hybels, & Pieper, 2001). In particular, depressive symptoms are common in older people with dementia in the form of Alzheimer's disease (AD) (Lyketsos & Olin, 2002; Rubin, Veiel, Kinscherf, Morris, & Storandt, 2001). Depressive symptoms in the elderly have already been associated with lack of social support (Henderson et al., 1986; Oxman et al., 1992). However, there has been little research on the effects of social support on individuals suffering from dementia (Waite, Bebbington, Skelton-Robinson, & Orrell, 2004). Another line of research inspired by the concept of motivational reserve by Forstmeier and Maercker (2008) found premorbid motivational abilities to be associated with symptoms of apathy and depression in cognitively impaired individuals (Mortby et al., 2011) and with risk of MCI (Simon Forstmeier et al., 2011). While social support is one of the most frequently studied psychosocial resources (Thoits, 1995), to our knowledge no study has looked at motivational variables mediating the relationship between social resources and depressive symptoms in individuals with and without cognitive impairment.

This study investigates several variables involved in motivational processes, including motivation regulation, decision regulation, activation regulation, and general self-efficacy, as mediators of the relationship between social network variables (network size, frequency of social contacts, satisfaction with social contacts, and social support) and depression assessed with the Geriatric Depression Scale (GDS). Participants were 190 adults with a mean age of 75 years (range: 56 - 94 years). The sample comprised 33 participants diagnosed with mild cognitive impairment (MCI), 39 participants diagnosed with early-stage Alzheimer's disease

(AD), and a group of 118 participants without any cognitive impairment. In this cross-sectional study, bivariate correlations and linear regression models were used to assess the association between the predictor variables and depression. Linear regression models were controlled for age, gender, cognitive status, and activities.

In the cognitively impaired group, 22% were classified as suffering from a depression (GDS cutoff > 5) versus 5% in the cognitively unimpaired group. Apart from activation regulation, motivational variables were equally important in cognitively impaired and unimpaired individuals, correlating negatively with depressive symptoms assessed with the GDS. All motivational variables (self-reported and informant-reported) significantly predicted lower depression in the total sample in a series of regression analyses. Of the social network variables, only social support was significantly associated with depression (β = -.20, p < .05). This relationship was mediated by activation regulation and decision regulation, both self-reported and informant-reported, and by informant-reported motivation regulation and general self-efficacy.

Although the underlying mechanisms are not clear, we suggest social support to be closely related to coping with difficult situations. Based on Thoits' (1986) definition of social support as coping assistance, the providers of social support help the receiver cope successfully with stressful situations, which in turn decreases the risk of a depressive reaction. This is in line with findings of Greenglass (1993), who has found an association between social support and proactive coping. This study expands on earlier studies on self-efficacy mediating the impact of social support on depression by including several motivational self-regulation skills as mediators. Prevention programs aiming at treating depression in old age should include motivational skills and the use of efficient coping strategies.

7. Discussion

While the impact of social support and social network on different health outcomes was extensively studied in the last decades, the underlying mechanisms linking social resources to health is still not clear. Several studies suggested self-efficacy and related constructs to mediate the influence of social support on health outcomes (Benight & Bandura, 2004; Bisconti & Bergeman, 1999; Cutrona & Troutman, 1986; Saltzman & Holahan, 2002; Smith et al., 2000). This PhD thesis expands on former findings in several aspects: First, further motivational variables relating to motivational processes besides self-efficacy were shown to mediate the relationship between social resources and health outcomes, namely motivation regulation (Paper 1 and 4), goal orientation and action planning (Paper 2), decision regulation (Paper 4), and activation regulation (Paper 4). Second, different health outcomes relevant in old age besides depression and PTSD were used to test our hypothesis – adjustment disorder symptoms (Paper 1), risk of dementia (Paper 2), and cognitive functioning (Paper 3). In this section, the major results of the studies will first be briefly summarized. Then, underlying mechanisms linking social and motivational resources to health outcomes are discussed. Finally, alternative explanations concerning the direction of the effects are provided. Furthermore, differential impacts of social and motivational resources are being discussed.

Major results

In all four studies, motivational resources correlated with the health outcomes: motivation regulation correlated with adjustment disorder symptoms (Paper 1) and depression (Paper 4); self-efficacy correlated with AJD symptoms (Paper 1), cognitive functioning (Paper 3), and depression (Paper 4); goal orientation and action planning

predicted risk of dementia in a longitudinal design (Paper 2); and decision regulation and activation regulation correlated with depression (Paper 4). Different aspects of social resources had different impact on health outcomes. While stress-related interpersonal resources, namely social acknowledgment and disclosure, related significantly with AJD symptoms (Paper 1), social support correlated with depression (Paper 4), but not with the other health outcomes. On the other hand, network size correlated with cognitive functioning (Paper 3), but not with depression (Paper 4). As predicted, motivational resources mediated the impact of social resources on health outcomes. General self-efficacy mediated the impact of social acknowledgment on AJD symptoms (Paper 1); also, it mediated the impact of social network size on cognitive functioning (Paper 3) and the impact of social support on depression (Paper 4). Motivation regulation mediated the relationship between social acknowledgment and AJD symptoms (Paper 1) and the impact of social support on depression (Paper 4). Finally, decision regulation and activation regulation mediated the impact of social support on depression (Paper 4). However, self-efficacy and motivation regulation were not found to mediate the link between reluctance to disclose and AJD symptoms (Paper 1). Also, social network variables did not interact with motivational resources when predicting risk of dementia (Paper 2).

Underlying mechanisms linking social support and emotional health outcomes

How can the beneficial impact of social support on depression (Paper 4) be explained? According to the buffering hypothesis concerning the indirect effect of social support on health (Cohen, 1988, 2004; Cohen et al., 2001; Cohen & Wills, 1985), social support is believed to help people cope with difficult situations. In line with the buffering hypothesis, Thoits (1986) suggested that social support operates primarily as "coping assistance." Thus,

the providers of social support help the receiver cope successfully with stressful situations. This in turn decreases the risk of a depressive reaction. Consistent with this hypothesis, the support-efficacy model of Antonucci & Jackson (1987) assumes that supportive others can help people cope with difficult situations by enhancing their feeling of self-efficacy. Thus, supportive others can help people to adapt to the challenges of aging by helping them to achieve their goals (Antonucci & Akiyama, 1997). Especially in old age, maintaining competence is best achieved through supportive interactions with others.

Furthermore, social integration is believed to promote self-esteem and perceived control over environment (Cohen, 1988), thus enhancing self-efficacy in socially integrated individuals. Several studies have proposed similar mechanisms in the context of stress-response syndromes. Based on a review of different studies, Benight & Bandura (2004) proposed perceived self-efficacy to mediate the effect of social support on posttraumatic recovery. The belief in one's capability to exercise some measure of control over traumatic adversity is supposed to have a crucial protective function (Benight & Bandura, 2004). This effect has been found in several samples of PTSD patients (Benight & Harper, 2002; Solomon, Benbenishty, & Mikulincer, 1991). Yet, results of study 1 (Paper 1) are somewhat contradictory to the existing literature, as social support and social network variables did not correlate with AJD symptoms. However, more stress-specific interpersonal variables, namely social acknowledgment as a victim and disclosure about the stressful event, emerged as significant predictors of AJD symptoms. Thus, the questionnaires assessing social support and social network may have been too unspecific with regard to adjustment to a critical life event.

Underlying mechanisms linking social network size and cognitive functioning

But how can the beneficial impact of social network size on cognitive functioning (Paper 3) be explained? In a cross-sectional survey of 1289 adults (Lauder, Mummery, Jones, & Caperchione, 2006), lonely individuals were more likely to be smokers and more likely to be overweight or obese. One possible explanation addresses the role of *health-promoting behaviors*. According to Cohen (1988), social norms and information provided by one's social network have an impact on health-promoting behaviors such as dieting, exercising, smoking or drinking alcohol. Socially integrated individuals are believed to have a higher self-esteem and perceived control, which in turn leads to a greater motivation to care for oneself. As high-risk health behaviors such as smoking (Peters et al., 2008), being overweight in middle age (Whitmer et al., 2008), and lack of physical exercise (Larson et al., 2006) have been associated with risk of dementia, the beneficial effect of social resources on cognitive health could be explained by a higher self-efficacy leading to avoiding these high-risk behaviors. Supporting this theory, self-efficacy beliefs were shown to influence the practice of health behaviors (Bandura, 1986). Consistent with these findings, physical activity was found to be strongly linked to social support (Spanier & Allison, 2001). In a cross-cultural health policy study (Stahl et al., 2001) with more than 3000 adults from six European countries participating, individuals who perceived low social support from their social environment were more than twice as likely to be sedentary compared to those who reported high social support from their personal environment. As an active lifestyle is associated with a decreased risk of dementia (Fratiglioni et al., 2004; Hultsch, Hertzog, Small, & Dixon, 1999; Simons, Simons, McCallum, & Friedlander, 2006; Wang et al., 2009), social integration might have an impact on risk of dementia via the adoption of a more active lifestyle.

Another explanation addresses the impact of social support and social integration on *stress level*. According to Cohen (1988), increased control and self-esteem caused by social support induces a suppression of neuroendocrine reactivity with a beneficial effect on health outcomes. Low internal locus of control has been related to higher cortisol levels (Pruessner et al., 2005), while proneness to distress is associated with an increased risk of Alzheimer's disease (Wilson et al., 2006). Thus, higher self-efficacy or locus of control is related to lower cortisol levels which decrease the risk of dementia. Also, a high level of self-efficacy might result in interpreting risky situations as a challenge rather than threat (Krueger and Dickson, 1993) leading to a lower stress levels.

Differential impact of social resources on health outcomes

Results of the studies of this PhD thesis underline the differential impact of various aspects of social resources. Social support emerged as a protective factor regarding depression (Paper 4) but not for cognitive impairment (Paper 3). Meanwhile, a larger social network was associated with higher cognitive functioning (Paper 3), but not with depression (Paper 4) or AJD symptoms (Paper 2). These results are consistent with a large body of literature reporting beneficial effects of social support on depression (e.g., Antonucci et al., 1997; George et al., 1989; Oxman et al., 1992), as opposed to a growing body of evidence linking social network size with cognitive functioning (e.g. Barnes et al., 2004; Bassuk et al., 1999; Beland et al., 2005), and risk of dementia (e.g., Fratiglioni et al., 2004). Other studies have found differential effects of different aspects of social resources. A large meta-analysis with findings from 286 studies on the link between social resources and well-being showed the quality of social contacts to be stronger associated with subjective well-being than with the quantity of social contacts (Pinquart & Sörensen, 2000). House et al. (1988) suggested that social support exerts its effect on health mainly in the presence of stressful events

based on the buffering hypothesis, while social network operates through main effects. Hence, different mechanisms account for different aspects of social resources. Another aspect often neglected when investigating social support is the importance of giving support to other individuals instead of receiving support. Thomas (2010) suggests that it is often better for the well-being of older adults to give than to receive. Evidence from different studies highlights the importance of giving support and its beneficial impact to older adults' well-being (Krause, Herzog, & Baker, 1992). Results have even shown that mortality was significantly reduced for individuals who reported providing support to friends, relatives and neighbours which was not the case for individuals receiving social support (Brown, Nesse, Vinokur, & Smith, 2003).

Underlying mechanisms linking motivational resources to cognitive functioning and emotional health

Based on the theory of the motivational reserve, exercising motivational abilities throughout life increases the number of synaptic connections and strengthens existing pathways while leading to the more efficient use of relevant brain networks and to the compensation of disrupted networks (Forstmeier & Maercker, 2008). Motivational resources may be linked to more socially and mentally *stimulating activities*, which are known to be related to a lower risk of dementia (e.g., Fratiglioni & Wang, 2007). Mentally stimulating activities at work (Karp et al., 2009) and participation in leisure activities (Crowe, Andel, Pedersen, Johansson, & Gatz, 2003; Karp et al., 2006; Verghese et al., 2003), were repeatedly found to be associated with a lower risk dementia. The positive influence of an enriched environment were also shown to reduce cognitive deficits in a mouse model of AD (Jankowsky et al., 2005), and to improve cognition in AD mice by amyloid-related and unrelated mechanisms (Costa et al., 2007). This suggests a beneficial effect of enrichment on

cognitive functioning. Further possible mechanisms address the influence of motivational resources on *health-promoting behaviors*. As described in paper 2, self-efficacy is especially related to the practice and adoption of health behaviors (Bandura, 1986). As high-risk health behaviors such as smoking (Peters et al., 2008), being overweight in middle age (Whitmer et al., 2008), and lack of physical exercise (Larson et al., 2006) are related to a higher risk of dementia, motivational resources may therefore influence incidence of dementia by impacting these risk factors. Finally, similar to social resources, motivational resources may have an influence on *stress levels*. Various aspects of motivation have been associated with stress levels. Perceived self-efficacy has been linked with general coping with stress (Lazarus & Folkman, 1987). Also, low internal locus of control has been associated to higher cortisol levels and smaller volume of the hippocampus (Pruessner et al., 2005; Pruessner, Hellhammer, & Kirschbaum, 1999). Furthermore, proneness to distress and stress hormones have been associated with risk of dementia (Magri et al., 2006; Wilson et al., 2006).

Regarding the underlying mechanisms relating motivational resources and emotional health outcomes, the use of efficient coping strategies may play a significant role (Paper 4). In previous studies, problem solving was shown to moderate stress-related depressive symptoms (Nezu & Ronan, 1988), suggesting that depressed patients rely on inadequate strategies to address their problems. As the failure to use adequate problem solving strategies might be due to deficits in motivational resources, and self-regulatory skills are important when coping with stressful situations (Beckmann & Kellmann, 2004), insufficient motivational resources may entail depressive symptoms or lead to AJD when faced with critical life events (Paper 1).

Reconsidering causality

As the mediating effect of motivational variables was only found in cross-sectional studies, no definite assumption about the direction of the effect can be made. The hypothesis suggesting motivational resources to be mediating factors is based on several studies that investigated self-efficacy as a mediating factor in the relationship between social resources and health outcomes. However, motivational abilities may not only be influenced by social resources, they may also have an impact on establishing a social network. Although few studies report similar results, self-efficacy was related to higher levels of social support in a longitudinal design (C. K. Holahan & Holahan, 1987). Also, better self-reported executive functioning, which is related to several motivational resources, was found to be a significant predictor of better social functioning (Dawson, Shear, & Strakowski, 2012). Furthermore, higher self-regulatory strength was found to have a beneficial influence on close relationships (Luchies, Finkel, & Fitzsimons, 2011), with higher scores on self-control correlating with better relationships and interpersonal skills (Tangney et al., 2004). In line with these results, disclosure was found to mediate the relationship between general self-efficacy and AJD symptoms (Paper 1). Thus, motivational resources might be the underlying factor for both better social functioning and better health outcomes.

The same consideration holds for the effect of social resources on cognitive functioning. While several studies have shown beneficial effects of social resources on risk of dementia and cognitive functioning (e.g., Fratiglioni et al., 2004), other studies suggest that social behaviour may also depend on an individual's intellectual and sensory ability to actively participate in social exchanges (Lang, Wagner, & Neyer, 2009). Thus, losses in cognitive and sensory abilities in old age may complicate social interactions with lower cognitive functioning leading to a smaller network.

Furthermore, cognitive impairment might also lead to lower motivational resources. Various studies reported deficiency in executive functions in AD (Patterson, Mack, Geldmacher, & Whitehouse, 1996; Rainville et al., 2002; Schroeter et al., 2012). The term executive functioning refers to mental activity that is involved in the planning, initiation, and regulation of behaviour (Lezak, 1982). Thus, motivational resources such as activation regulation, decision regulation, motivation regulation, goal orientation and action planning seem to be closely intertwined with executive functioning, as they are also required in planning, initiating and regulating behaviour. Compared to normal elderly subjects, plans of individuals with AD were found to be poorly structured, indicating basic problem-solving disorders (Passini, Rainville, Marchand, & Joanette, 1995). Impairment in executive functioning were shown to occur early in individuals with AD (Perry & Hodges, 1999; Silveri, Reali, Jenner, & Puopolo, 2007), suggesting that lower motivational resources in cognitively impaired individuals may be due to ongoing dementia-related pathological processes in the brain prior to the manifestation of clinically relevant symptoms. Also, it seems obvious that better cognitive functioning leads to better planning and organizational behaviour.

However, studies have found motivational abilities to predict odds of cognitive impairment not only in cross-sectional, but also in longitudinal designs (Paper 2; Forstmeier et al., 2011), lending support to the theory of Motivational Reserve (Forstmeier & Maercker, 2008). Also, while motivational resources share similarities with executive functions, they were not found to correlate (Forstmeier, Drobetz, & Maercker, 2011), providing empirical evidence that motivational resources refer to a different set of abilities than executive functioning. Thus, high motivational resources in a pre-clinical phase seem to exert a protective influence on the development on cognitive impairment and dementia in the long term.

Limits of motivational and social resources

A vast amount of studies confirmed the beneficial effects of motivational and social resources on health outcomes. However, Janoff-Bulman and Brickman (1982) suggested that the need to take control can backfire in extremely stressful situation in which control is not possible (Janoff-Bulman & Brickman, 1982). In the face of severe illness, such as dementia, high self-efficacy might thus have a negative impact on well-being and enhance depression. Also, individuals' self-control may decrease after exerting self-control because self-control draws on a resource that is limited and consumes self-control strength (Muraven & Baumeister, 2000; Muraven & Slessareva, 2003). However, self-efficacy was positively correlated with all health outcomes in the studies at hand (Paper 1, 3 & 4).

Nevertheless, other resources such as social support might have a negative impact on health outcomes in certain circumstances (Antonucci, Akiyama, & Lansford, 1998). Results show that negative social outcomes are more consistently and more strongly related to well-being than positive social outcomes (Rook, 1984). Revenson, Schiaffino, Majerovitz, and Gibofsky (1991) emphasize the need to consider positive and negative aspects of support transactions. As in the studies at hand, negative aspects of social support were not assessed, which may account for missing effects of social support on AJD symptoms (Paper 1). Furthermore, to have to rely on support from others can even decrease the sense of competence (Siebert, Mutran, & Reitzes, 1999) and have negative effects on well-being (Lee, Netzer, & Coward, 1995). Higher frequency of instrumental support was even shown to increase risk of disability in activities of daily life (ADL) among men (Seeman, Bruce, & McAvay, 1996). Thus, when different aspects of social support are not assessed, higher social support does not necessarily lead to higher well-being and higher cognitive functioning.

Conceptual limitations

Several issues concerning the conceptual limitations have to be discussed.

First, as stated in Paper 1, the theoretical conceptualization of adjustment disorder as a stress response disorder is relatively new. While this new conceptualization offers a detailed and elaborate description of this disorder, the differences to the conceptualization of the DSM-IV-TR (American Psychiatric Association, 2000) are substantial. Future studies on the topic should address this issue and examine if the effects of social and motivational variables emerge also when assessing adjustment disorder according to the conceptualization of the DSM-IV-TR.

Second, while the concept of the Motivational Reserve developed by Forstmeier and Maercker (2008) proposes a novel and intriguing aspect contributing to the concept of the Cognitive Reserve (Stern, 2006), several questions arise. The motivational variables constituting the Motivational Reserve share some similarities with executive functions. While former studies have shown no correlations between motivational variables and executive functioning (Forstmeier, Drobetz, & Maercker, 2011), this issue needs to be addressed in future studies by disentangling executive functions and motivational abilities. Furthermore, future studies should examine the associations between Cognitive Reserve, current cognitive status, education, former intelligence and current stress level proposed by Forstmeier and Maercker (2008) more closely.

Third, the concept of the mediational effect of motivation-related variables in the relationship between social resources and health outcomes is based on the support/efficacy model by Antonucci and Jackson (1987) and a variety of empirical findings confirming this effect. However, most studies have examined these associations in a cross-sectional design.

Future studies should therefore use a longitudinal design to give further support to this concept and enabling causal interpretations of the findings.

Conclusion

Despite several conceptual limitations, evidence of this thesis underlines the importance of resources in old age. Motivational resources play an important protective role when dealing with adverse events, solving problems, and maintaining cognitive functioning in old age. Not only were they shown to be associated with lower depression (Paper 4), higher cognitive functioning (Paper 3), risk of dementia over the long term (Paper 2), and AJD symptoms (Paper 1), they also mediated the impact of social resources on cognitive functioning (Paper 3), depression (Paper 4), and AJD symptoms (Paper 2). Different aspects of social resources, namely social support and social network size, had different impact on health outcomes. Coping assistance provided by supportive others and control beliefs over traumatic adversity may constitute the underlying mechanisms linking social support with emotional health outcomes such as depression and AJD symptoms. Health-promoting behaviours, lower stress levels, and stimulating activities may account for the beneficial impact of social network size and motivational resources on cognitive functioning and risk of dementia in older age. Causal interpretations have to be made with caution as only one study (Paper 2) provides evidence based on a longitudinal design.

8. Clinical implications

What are the clinical implications of these results? How do they relate to findings in psychotherapy research? After studying thousands of findings on therapy effects, Grawe (1997) has found the activation of resources to be one of four basic mechanisms of change

in therapy, together with mastery/coping, clarification of meaning, and problem activation. According to Grawe (1997, p. 5/6),

> "[p]sychotherapy can only work with that which the patient brings with him or her into therapy, specifically, in terms of motivational readiness and abilities. These resources must be activated and used as effectively as possible by the therapist because they are the actual motor that drives the therapeutic endeavour".

Grawe (1997) concludes that over a wide variety of therapy forms and settings, therapy is especially effective when considering patients' positive potential, abilities, strengths and motivation. While problem activation refers to the finding that a patient must come into direct contact with painful emotions to overcome his or her problems, resource activation aims at the sound and healthy parts of the patient's personality (Gassmann & Grawe, 2006), contrasting with the more traditional deficit-oriented view of therapy (Tedeschi & Kilmer, 2005). Comparing the two therapeutic strategies, problem activation was only found to lead to therapeutic progress when combined with thorough resource activation (Gassmann & Grawe, 2006), underlining the importance of resources in therapy. In a study by Flückiger and Grosse Holtforth (2008), focusing the therapist's attention on the patients' individual strengths before each therapy session fostered mastery experiences of the patient and improved therapy outcome. Thus, resources proved to be an important issue in psychotherapy.

Social support interventions

What about specific aspects of resources, how can e.g. social resources be enhanced? While the role of social support has been extensively studied in the past decades, it is not clear whether social support interventions are actually successful at improving support. An

extensive review of 100 studies evaluating the efficacy of such interventions provided some support for the overall usefulness of social support interventions (Hogan, Linden, & Najaran, 2002). Yet, there is not enough evidence to conclude which interventions work best for what problems (Hogan et al., 2002). A social support intervention study to enhance social support after stroke revealed no significant effects on psychosocial outcomes (Friedland & McColl, 1992), while other studies on social support interventions have revealed beneficial effects to prevent low birth weight (Norbeck, DeJoseph, & Smith, 1996) and mixed effects on smoking cessation (May & West, 2000). However, Bisconti and Bergeman (1999) and Smith et al. (2000) conclude from their studies that interventions designed to increase feelings of control in relationships may be more beneficial for enhancing well-being than efforts to increase the size or structure of the social network. This consideration might be also apply for interventions aiming at influencing cognitive functioning and decreasing risk of Alzheimer's disease as well as preventing adjustment disorder after a critical incident or a personal loss. Thus, interventions focusing on resources of the individuals rather than their social network might be more effective. Another reason to concentrate on personal resources is provided by the mediating effect of different motivational resources on the relationship between social resources on various health outcomes in the studies at hand.

Enhancing motivational resources

How can motivational resources be enhanced? In order to strengthen motivational and volitional competences, Kehr (2004) developed a self-management training (SMT) consisting of several modules including goal setting, the reduction of conflicting goals, the perception of implicit motives, the perception and strengthening of volitional competences, the reduction of rigid self-control, enhancement of intrinsic motivation, and finally, the overcoming of action barriers. Another manual aiming at enhancing volitional competences

was developed by Forstmeier & Rüddel (group therapy for enhancing volitional competences; 2002), based on the training of self-regulation and self-control. Different competences such as attention control, emotion control, goal setting, planning abilities and impulse control abilities are trained. Not only were the volitional competences found to be improved after the group therapy for enhancing volitional competences. Patients with greater volitional improvements also had a better rehabilitation outcome with lower depression and less physical symptoms reported by the participants (Forstmeier, 2005; Forstmeier & Rüddel, 2007). In the following section, the malleability of each of the motivational resources is discussed following the different phases of the action phase model (Heckhausen & Gollwitzer, 1987; Gollwitzer, 1996) in chronological order.

Decision Regulation and Goal Orientation

In the decision making process, different goals compete with each other. Results indicate that goal conflicts that persevere over time are associated with inhibited attainment of new goals (Kehr, 2003). Thus, it is important to deal with goal conflicts to be able to make a decision. The self-management training of Kehr (2004) proposes a training to enhance decision making by first gathering the required information needed for the decision process, and then to evaluate the information at hand. This two-phase-strategy should prevent premature decision making without having all necessary information. The training of volitional competences of Forstmeier and Rüddel (2002) proposes a step-by-step program, including the perception of personal goals, motives, interests and values and formulating specific goals to facilitate the decision making progress and enhance decision regulation.

Action Planning

As noted previously, planning involves the anticipation of future relevant contexts and actions (Gollwitzer, poa) and is needed in the preactional phase to prepare an individual

for initiating and executing actions. The group therapy for enhancing volitional competences (Forstmeier & Rüddel, 2002) includes a training involving the improvement of planning abilities. First, individuals have to determine different small steps leading eventually to goal attainment. Then, they have to specify when, for how long, and in what chronological order they will apply these steps. Finally, they are asked to determine with whom they will reach their goal, under what conditions and where the plan will be realized.

Activation Regulation

Activation regulation refers to a self-regulative ability required to initiate and maintain a movement to reach a goal (Kruglanski et al, 2000). Kuhl and Fuhrmann (1998) differentiate between a calming and an activating component of activation regulation. Again, the group therapy for enhancing volitional competences by Forstmeier and Rüddel (2002) provides the individuals with a detailed step-by-step program to enhance activation regulation. Similar to Kehr (2004), they suggest relaxation techniques to calm down. In addition to physical relaxation exercises by Jacobson (1938), autogenic relaxation techniques including imagination strategies are recommended to calm down mentally. To reach the desired activation levels, short physical exercise units are part of this module to demonstrate the energising effect of light physical exercise. Additionally, Kehr (2004) underlines the importance to set realistic goals in order to reach the desired state of activation.

Motivation Regulation

To be able to persevere on a specific task to reach a goal, the motivation has to be maintained. Forstmeier und Rüddel (2002) propose different strategies to enhance motivation regulation. They suggest to visualize positive consequences when having reached the goal and thinking about the significance of goal attainment. Further, they underline the importance to reward and encourage oneself, to keep track of small progressions already

achieved, and to look for fun parts when doing the task. Kehr (2004) suggests thinking about individual strengths and past successes, thus rather aiming at enhancing the self-efficacy.

Self-efficacy

Schunk and Ertmer (2000) suggested that goals, self-monitoring, and self-evaluations of progress affect self-efficacy. Gist and Mitchell (1992) identified different determinants and proposed strategies that facilitate the most immediate change in task-specific self-efficacy. According to Gist and Mitchell (1992), the more people believe that the causes of their performance are uncontrollable, the lower and more resistant to change will be their self-efficacy. They suggest different strategies to enhance self-efficacy, namely providing information that gives the individual a more thorough understanding of the task at hand; providing training that directly improves the individual's ability in performing the task; and finally, providing information that improves the individual's understanding of performance strategies required for task performance. However, Gist and Mitchell (1992) also note that when individuals do not have the ability to perform well on a particular task, continued attempts to work harder may be detrimental to self-esteem over time. Further, they argue that permanent, positive changes in an individual's self-efficacy cannot be established for every task.

9. Outlook

The findings of this PhD studies provide evidence for the beneficial effect of motivational resources on various therapy outcomes. As motivational resources can be enhanced with different techniques and strategies (Forstmeier, 2005; Forstmeier & Rüddel, 2002; Kehr, 2004), therapy outcomes would benefit from the implementation of modules to

enhance volitional competences. While Grawe (1997) has underlined the importance of resource activation in therapy in general, this PhD thesis advocates a focus on motivational aspects. The training of motivational abilities might be especially effective before the onset of clinically relevant symptoms of an emotional or cognitive disorder in terms of a prevention intervention. Thus, in old age, interventions aiming at enhancing motivational resources should focus particularly at cognitively and emotionally healthy elderly individuals.

Recent research provides further evidence for the importance of the reinforcement of an active lifestyle integrating motivational, social, and cognitive activities (Depp, Harmell, & Vahia, 2012). Doyle, Mc Kee, and Sherrif (2012) put the emphasis on personal resilience and continued involvement in physical and social activities and suggest that an engagement with life and society should be the norm for ageing populations. Findings by Kahana, Kelly-Moore, and Kahana (2012) show that older adults can deal actively with challenges by relying on accumulated resources when faced with health-related and social stressors. Recently, self-esteem and expectancy of personal control were shown to buffer the effects of declining activities of daily life on perceptions of aging which may ultimately increase health outcomes and quality of life (Sargent-Cox, Anstey, & Luszcz, 2012). Thus, a variety of recent findings in research underlines the importance of individual resources in the context of successful aging.

Future studies on the topic should address coping mechanisms, as there might be important underlying mechanisms linking motivational and social resources with health outcomes. Proactive coping has been proposed to be an important contributor to successful aging, since it results in a prolonged availability of resources for optimization and compensation processes (Ouwehand, de Ridder, & Bensing, 2007). As pointed out by Aspinwall and Taylor (1997), the advantage of proactive coping is that potential stressors can

be identified and encountered in an early stage, thus lowering the impact of the stressful event. The role of stress hormones would be another mechanism worthy of exploration in future studies. Glucocortiocoids, the adrenal steroids secreted during stress, were shown to have a variety of detrimental effects if secreted in excess. These have adverse effects on the nervous system, particularly the hippocampus (Sapolsky, 1999). Besides deleterious effects on memory (Kirschbaum, Wolf, May, Wippich, & Hellhammer, 1996; Kuhlmann, Piel, & Wolf, 2005), stress hormones have been associated with depression (Kendler, Karkowski, & Prescott, 1999) and mood disorders (McEwen, 2005). Finally, future studies investigating the role of resources in successful aging should consider health-promoting behaviours, as they are crucial for health in old age.

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